



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,547	08/29/2001	Masatoshi Ito	040356-0386	4760

22428 7590 03/16/2004

FOLEY AND LARDNER

SUITE 500

3000 K STREET NW

WASHINGTON, DC 20007

EXAMINER

CREPEAU, JONATHAN

ART UNIT

PAPER NUMBER

1746

DATE MAILED: 03/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/940,547

Applicant(s)

IIO ET AL.

Examiner

Jonathan S. Crepeau

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5 and 6 is/are rejected.
- 7) ☒ Claim(s) 2-4,7 and 8 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 8/29/01.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 5-129029 in view of Epp et al (U.S. Patent 6,063,515) and JP 11-116202.

Regarding claim 1, JP '029 is directed to a fuel cell system comprising a fuel cell stack (27), a membrane hydrogen separator (12) having a pre-separation side facing a reformat gas and a post-separation side, a hydrogen supply passage (29) which supplies hydrogen at the post-separation side to the anode chamber of the fuel cell, and an anode effluent recirculation passage (30) which recirculates anode effluent to the post-separation side of the membrane (see Fig. 1; abstract).

JP '029 does not expressly teach that the recirculation passage comprises a discharge valve, as recited in claim 1, or that the system comprises an intake valve which introduces a gas other than hydrogen to the hydrogen supply passage, as recited in claim 1.

Epp et al. is directed to a fuel cell system comprising an anode recirculation loop (322) (see Fig. 3). A purge valve (391) discharges gas from the loop (see col. 10, line 27).

Art Unit: 1746

The artisan would be motivated to incorporate the purge valve of Epp et al. into the anode recirculation line of JP '029 because in column 10, line 23, Epp et al. teach the following:

outlet 382 by compressor 372. Because the fuel stream is substantially pure hydrogen, it may be recirculated through the stack via loop 322 for prolonged operating periods without significant accumulation of inerts or impurities in the loop. However, purge valve 391 provides the facility to occasionally purge or bleed the fuel recirculation loop 322, for example, during surface operations. The vaporizer water

Accordingly, the artisan would be motivated to incorporate the purge (discharge) valve of Epp et al. into the anode recirculation line of JP '029 in hopes of purging impurities in an expedient manner, should any impurities occur in the recirculation line.

In addition, JP 11-116202 is directed to a pressure reforming device for a fuel cell (see abstract). The device contains a hydrogen permeable membrane (16a) and a post-separation chamber (16). A sweep gas such as steam or nitrogen is supplied to the chamber to carry hydrogen out of the chamber (see paragraph 18 of the machine translation).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of JP '602 to supply a non-hydrogen sweep gas to the hydrogen post-separation chamber of JP '029. In the abstract, JP '602 teaches that "the flow rate of the sweeping gas is settled so that the hydrogen partial pressure in the reforming chamber is constantly higher than in the permeating chamber," which results in a reforming device that is "capable of attaining high reforming efficiency under pressure without increasing the operation temperature." Accordingly, the artisan would be sufficiently motivated by the disclosure of JP '602 to supply a non-hydrogen sweep gas to the hydrogen post-separation chamber of JP '029. In addition, the inclusion of an intake valve to control the flowrate of the sweep gas would obvious to a skilled

artisan. JP '602 recognizes that the flowrate of the sweep gas controls the partial pressure on the post-separation side of the membrane, and valves are well-suited to perform precise control of flowrates. Accordingly, the inclusion of a valve would also be rendered obvious by JP '602. Furthermore, the control scheme recited in instant claims 5 and 6 would also be rendered obvious by the disclosure of JP '602. Claim 5 recites that when the hydrogen partial pressure is high, the intake valve is opened, thereby increasing the sweep gas and lowering the hydrogen partial pressure. Although JP '602 does not expressly disclose a partial pressure sensor or calculator and the step of controlling the sweep gas flowrate based on the measured or calculated partial pressure of hydrogen, this configuration would be obvious based on the JP '602 reference's emphasis on controlling the flowrate of sweep gas to affect the hydrogen partial pressure on the permeate side of the membrane. Additionally, the artisan would be sufficiently skilled to use any known means for detecting hydrogen partial pressure, such as an absolute pressure sensor in combination with a hydrogen concentration sensor. Accordingly, the subject matter of claim 6 would also be rendered obvious to the skilled artisan.

Allowable Subject Matter

3. Claims 2-4, 7, and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
4. The following is a statement of reasons for the indication of allowable subject matter:

Art Unit: 1746

Dependent claim 2 recites, among other features, that the intake valve introduces part of the air supplied to the cathode chamber to the anode effluent recirculation passage. Neither JP 5-129029 nor JP 11-116202 teaches or fairly suggests this subject matter.

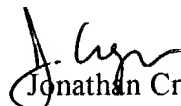
Dependent claim 3 recites that the intake valve introduces a combusted gas to the hydrogen supply passage. JP 5-129029 and JP 11-116202 also do not teach or fairly suggest this subject matter.

Dependent claim 4 recites that the intake valve introduces part of a cathode effluent to the anode effluent recirculation passage. JP 5-129029 and JP 11-116202 also do not teach or fairly suggest this subject matter.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (571) 272-1302. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (703) 872-9306.


Jonathan Crepeau
Patent Examiner
Art Unit 1746
March 6, 2004